ALGORITHMS AND DYNAMIC DATA STRUCTURES

CHAPTER 0: GENERAL OVERVIEW

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Rules

- **Access to the lecture hall:**
  - Once the lecture has started, no one is allowed to enter the hall.
- **No food or drinks allowed:**
  - Eating or drinking during the lecture is strictly prohibited.
- **Mutual respect:**
  - Respect is essential.
  - I respect you, and I expect the same in return.
  - Any form of disrespect is not tolerated.
- **Silence and attention:**
  - Mobile phones must be switched off.
  - Conversations and other disruptive behaviors are not allowed.
- **No recording without permission:**
  - Audio/video recording is not allowed unless explicit authorization.
- **No AI is allowed to solve problems:**
  - Solve problems without relying on AI tools (ChatGPT, Copilot, DeepSeek…).

Chapter 0: General Overview

- **Introduction to Pointers (02 h)**
  - o Pointers & Memory allocations
- **Linked Linear Lists data structures (04 h)**
  - o Definitions
  - o Basic functions and manipulations (length, access, deletion, …)
  - o List sorting
  - o List implementation with contiguous representation
  - • Doubly Linked Lists and Circular Lists
- **Queues and Stacks data structures (02 h)**
  - o Definition
  - o Basic functions and utilization
  - o Implementation of Queues and Stacks

Content

- **Recursion (06h)**
  - Principle, Design of recursive solutions,
  - Implementation details of recursion,
  - Switching from recursive to iterative algorithms
- **Trees (06 h)**
  - Definition, basic functions
  - Binary trees
    - Definition, basic functions
    - Binary search trees (manipulation)
  - M-trees
    - Definition, basic functions
    - Binary tree transformation
- **Algorithm Complexity (06h)**
  - O-notation
  - Rules for calculating the complexity of an iterative algorithm

Personal work:

- One (01) mini-project must be completed over the second semester, even:
  - o Individually: One student.
  - o A pair of students from different groups/sections.
- Evaluation of the mini-project will be based on:
  - o A written report.
  - o A demonstration of the mini-project to a teacher.

Required skills

- **Basic concepts already covered in the first semester:**
  - Algorithms and Static Data Structures.
- **Minimum level of general culture:**
  - Since the problems are from various fields.
- **Mathematical concepts:**
  - Relevant to algorithmic thinking.
- **Own solutions:**
  - Find your own solutions to the problems.
- **Focus on the method:**
  - Learn the approach to solving problems, rather than simply memorizing solutions.
- **Practice extensively:**
  - Solve a large number of exercises to develop and improve problem-solving skills.

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